Exercise Solutions for Math 20

Conics (Parabola and Ellipse)

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1.1 Determine the vertex and orientation of the following parabolas.

1.1.a $4y^2 + 4y + x = 2$

$\Rightarrow 4y^2 + 4y = -x + 2$ $\Rightarrow y^2 + y = -\frac{x}{4} + \frac{2}{4}$ $\Rightarrow y^2 + y = -\frac{x}{4} + \frac{1}{2}$	Isolate y.
$\Rightarrow y^2 + y + \frac{1}{4} = -\frac{x}{4} + \frac{1}{2} + \frac{1}{4}$ $\Rightarrow (y + \frac{1}{2})^2 = -\frac{x}{4} + \frac{3}{4}$ $\Rightarrow (y + \frac{1}{2})^2 = -\frac{1}{4}(x - 3)$ $\Rightarrow (y + \frac{1}{2})^2 = 4(-\frac{1}{16})(x - 3)$	Complete the square.
$\Rightarrow$ Opening to the left, $(h, k) = (3, -\frac{1}{2})$ ■	Final answer.